

What is claimed is:

- Sub 9.17
1. A thin-film transistor comprising:
a substrate; and
a gate including a double-layered structure having a first metal layer and a second metal layer disposed on the substrate, the first metal layer being wider than the second metal layer by about 1 to 4 μm .
 2. The thin-film transistor as claimed in claim 1, wherein the second metal layer is located in a middle portion of the first metal layer so that two side portions of the first metal layer having no second metal layer disposed thereon have the same width as each other.
 3. ~~The thin-film transistor as claimed in claim 1, wherein the first metal layer includes at least one of Al, Cu, and Au.~~
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4. The thin-film transistor as claimed in claim 1, wherein the second metal layer includes at least one of Mo, Ta, and Co.

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5. A thin-film transistor comprising:
a substrate;
a gate including a double-layered structure having a first metal layer and a second metal layer disposed on the substrate, the first metal layer being wider than the second metal layer by about 1 to 4 μm ;
a first insulating layer disposed on the substrate including the gate;
a semiconductor layer disposed on a portion of the insulating layer at a location corresponding to the gate;
an ohmic contact layer disposed on two sides of the semiconductor layer;
a source electrode and a drain electrode disposed on the ohmic contact layer and extending onto the first insulating layer; and
a second insulating layer covering the semiconductor layer, the source and drain electrodes and the first insulating layer.

5. The thin-film transistor as claimed in claim ⁴5, wherein the second metal layer is located in a middle portion of the first metal layer so that two side portions of the first metal

layer having no second metal layer thereon have the same width as each other.

7. The thin-film transistor as claimed in claim 5, wherein the first metal layer includes at least one of Al, Cu, and Au.

8. The thin-film transistor as claimed in claim 5, wherein the second metal layer includes at least one of Mo, Ta, and Co.

9. A method of making a thin-film transistor, comprising the steps of:

depositing a first metal layer on a substrate;

depositing a second metal layer on the first metal layer directly after the step of depositing the first metal layer;

forming a single photoresist having a predetermined width on the second metal layer;

patterning the second metal layer using the single photoresist as a mask;

patterning the first metal layer using the photoresist as a mask, the first metal layer being etched to have a width greater than a width of the second metal layer thus forming a gate having

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a laminated structure of the first and second metal layers; and removing the photoresist; wherein the steps of patterning the second metal layer and the first metal layer each comprise a single etching step.

10. The method of making a thin-film transistor as claimed in claim 9, wherein the step of patterning the second metal layer includes the step of isotropic etching using the single photoresist and the step of patterning the first metal layer includes the step of anisotropic etching using the single photoresist as a mask, the second metal layer being etched to be wider than the photoresist by about 1 to 4 μm .

11. The method of making a thin-film transistor as claimed in claim 9, further comprising the steps of:

forming a first insulating layer on the substrate including the gate;

forming a semiconductor layer and an ohmic contact layer on a portion of the first insulating layer at a location corresponding to the gate;

forming a source electrode and a drain electrode extending

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onto the first insulating layer on two sides of the ohmic contact layer, and removing a portion of the ohmic contact layer exposed between the source and drain electrodes; and

forming a second insulating layer covering the semiconductor layer, the source electrode, the drain electrode and the first insulating layer.

12. The method of making a thin-film transistor as claimed in claim 9, wherein the first and second metal layers are sequentially deposited via sputtering or chemical vapor deposition method without breaking a vacuum state.

13. The method of making a thin-film transistor as claimed in claim 9, wherein the first metal layer is formed from Al, Cu, or Au.

14. The method of making a thin-film transistor as claimed in claim 9, wherein the first metal layer has a thickness of about 500 - 4000 A.

15. The method of making a thin-film transistor as claimed

in claim 9, wherein the second metal layer is formed from Mo, Ta, or Co.

16. The method of fabricating a thin-film transistor as claimed in claim 9, wherein the second metal layer has a thickness of about 500 - 2000 A.

17. The method of making a thin-film transistor as claimed in claim 9, wherein the second metal layer is etched with an etching solution prepared with a mixture of phosphoric acid H_3PO_4 , acetic acid CH_3COOH and nitric acid HNO_3 .

18. The method of making a thin-film transistor as claimed in claim 9, wherein the first metal layer is removed via a dry etching process.

19. The method of making a thin-film transistor as claimed in claim 9, wherein two side portions of the first metal layer having no second metal layer deposited thereon have the same width as each other.

20. A method of making a thin-film transistor, comprising the steps of:

depositing a first metal layer on a substrate;

depositing a second metal layer on the first metal layer without forming a photoresist on the first metal layer beforehand;

forming a photoresist having a predetermined width on the second metal layer;

anisotropically etching the first and second metal layers so such that the first metal layer and the second metal layer have the same width of the photoresist by using the photoresist as a mask;

isotropically etching the second metal layer such that the second metal layer is wider than the photoresist by about 1 to 4 μm by using the photoresist as a mask, thus forming a gate having a double-layered structure including the first and second metal layers; and

removing the photoresist.

21. The method of making a thin-film transistor as claimed in claim 20, further comprising the steps of:

forming a first insulating layer on the substrate including the gate;

forming a semiconductor layer and an ohmic contact layer on a portion of the first insulating layer at a location corresponding to the gate;

forming a source electrode and drain electrode extending onto the first insulating layer on two sides of the ohmic contact layer, and removing a portion of the ohmic contact layer exposed between the source and drain electrodes; and

forming a second insulating layer covering the semiconductor layer, the source electrode, the drain electrode and the first insulating layer.

22. The method of making a thin-film transistor as claimed in claim 20, wherein the first metal layer is formed from Al, Cu, or Au.

23. The method of making a thin-film transistor as claimed in claim 20, wherein the second metal layer is formed from Mo, Ta, or Co.

24. The method of making a thin-film transistor as claimed in claim 20, wherein the first and second metal layers are removed via a dry etching method.

25. The method of making a thin-film transistor as claimed in claim 20, wherein the second metal layer is etched with an etching solution prepared with a mixture of phosphoric acid H_3PO_4 , acetic acid CH_3COOH and nitric acid HNO_3 .

26. A method of making a thin-film transistor, comprising the steps of:

depositing a first metal layer on a substrate;

depositing a second metal layer on the first metal layer without forming a photoresist on the first metal layer beforehand;

forming a single photoresist having a predetermined width on the second metal layer;

patterning the first and second metal layers simultaneously in a single etching step using the single photoresist as a mask; and

removing the photoresist.